Meridian 1

Intelligent peripheral equipment circuit cards for Switzerland

Option 11 - Description and Installation

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About this document

This document is a Supplement to the Option 11 *Installation guide* (553-3011-210). It describes the functions and applications of the following circuit cards that are available for use in Switzerland:

- NT5K82AA Central Office Trunk card
- NT5K83AA E&M Tie Trunk card
- NT5K84AA Direct Inward Dial trunk card.

Central office trunk circuit card

Functional description

The NT5K82AA Central Office trunk card provides the interface between the Option 11 system and up to eight analog central office (CO) trunks. It can be installed in slots 1-10 in the main cabinet and in any slot in the expansion cabinet.

Common features

The NT5K82AA Central office trunk card:

- is equipped with eight trunk units
- supports internal 12 kHz periodic pulse metering (PPM)
- allows trunk type to be configured on a per unit basis
- allows individual units or the entire board to be disabled by software
- provides software selectable A-law or μ-law companding
- indicates self-test status during an automatic or manual self-test
- provides card-identification for auto configuration, and for determining the serial number and firmware level of the card
- converts transmission signals from analog-to-digital and from digital-to-analog
- supports the new Swiss loss plan
- provides adjustable transmission pads for long or short line operation

- provides termination and transhybrid balance impedance to match the Swiss complex impedance network
- provides direct reporting of Periodic Pulse Metering (PPM) pulses to software in either buffered or unbuffered format.
- supports loop break detection and supervision on a per unit basis
- supports barring detection and supervision on a per unit basis
- supports busy tone detection and supervision on a per unit basis.

Physical description

Switch settings

There are no option switches on the NT5K82AA Central office trunk card. All settings are configured in software.

Connections

The NT5K82AA Central office trunk card has eight units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal.

Hardware installation

Table 1 provides cross connect information for the NT5K82AA Central Office Trunk card.

Table 1
NT5K82AA Central Office Trunk connections

Lead	Pins	Pair color	Unit number
T0 R0	26 1	W-BL BL-W	Unit 0
	27 2	W-O O-W	
T1 R1	28 3	W-G G-W	Unit 1
	29 4	W-BR BR-W	
T2 R2	30 5	W-S S-W	Unit 2
	31 6	R-BL BL-R	
T3 R3	32 7	R-O O-R	Unit 3
	33 8	R-G G-R	
T4 R4	34 9	R-BR BR-R	Unit 4
	35 10	R-S S-R	
T5 R5	36 11	BK-BL BL-BK	Unit 5
	37 12	BK-O O-BK	
T6 R6	38 13	BK-G G-BK	Unit 6
	39 14	BK-BR BR-BK	
T7 R7	40 15	BK-S S-BK	Unit 7
	41 16	Y-BL BL-Y	

Trunk configuration

Route Data Block

Each trunk unit on the NT5K82AA central office trunk card is attached to a route with an associated route data block. Periodic Pulse Metering (PPM) and trunk timers are configured on a route basis. The route data block is programmed in overlay 16.

> ***Note:*** All prompts are defaulted except for those noted in Table 2. Default values are shown in brackets.

Table 2
LD 16 Route Data Block

Prompt	Response	Comments
REQ	NEW	
TYPE	RDB	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-511	Enter route number
TKTP	COT	Define trunk type as Central Office
ICOG	IAO	Incoming and Outgoing trunk
CNTL	YES	Change a trunk timer
TIMER	RGV 128	Set Ring Validation Timer to 128 ms
	GTO 640	Set Guard Timer Outgoing to 640 ms
CDR	YES	Call Detail Recording allowed
MR	(NO), PPM, XLD	PPM is off, buffered or unbuffered on this route

Trunk Data Block

Use overlay 14 to configure each of the trunk units on the NT5K82AA central office trunk. Default values are shown in brackets.

Table 3
LD 14 Route Data Block

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	COT	Central Office Trunk
TN	CC UU	Terminal number of the unit in Option 11 format: CC=card number UU=unit number
XTRK (see note)	XCOT	Type is IPE COT
CDEN	(8D)	Card density is 8D (default)
SIGL	LOP	Loop start signaling
PPID (see note)	04	Swiss PPM ID
BTID (see note)	04	Swiss Busy Tone ID
CLS	SHL, (LOL)	Attenuation Pads In, (Out)
	BTS, (XBTD)	Busy tone supervision enabled, (disabled)
	DTN, (DIP)	Digitone signaling, (digitpulse)
	BARA, (BARD)	Barring supervision enabled, (disabled)
	LBS, (XLBS)	Loop break supervision enabled, (disabled)

Note: These prompts are required only for the first unit defined on each NT5K82AA card.

Self-test

When the NT5K82AA trunk card is installed and power is applied to it, a self-test is performed on the card. The red LED on the NT5K93 faceplate flashes three times, then remains continuously lit until the card is enabled in software. If the self-test fails, the LED will remain lit.

Technical description

Power requirements

Table 4 shows the power requirements for the NT5K82AA Central office trunk card.

Table 4Table 1-4
NT5K82AA circuit card power requirements

Voltage	Idle current	Active current
+15.0 V dc (see note 1)	220 ma	400 ma
-15.0V dc (see note 1)	220 ma	300 ma
+ 8.5 V dc (see note 2)	160 ma	160 ma
+ 5.0 V dc	160 ma	330 ma

Note 1: Analog circuitry is powered with +/- 12V generated from +/- 15V. The maximum current imbalance between the +/- 15V rails is 100 ma per circuit pack.

Note 2: 8.5V is regulated to give 5V.

Environmental specifications

Table 5 lists the environmental specifications of the NT5K82AA Central office trunk card.

Table 5
NT5K82AA circuit card environmental specifications

Parameter	Specifications
Operating temperature	0 to 45 degrees C, ambient
Operating humidity	10 to 95 % Relative Humidity
Storage temperature	- 45 to + 70 degrees C
Storage humidity	0 to 95% Relative Humidity

Transmission parameters

The NT5K82AA Central office trunk card supports the new Swiss loss plan. Software configuration allows the selection of 2dB short line loss pads on a per unit basis.

The loss plan for the NT5K82AA Central office trunk card is given in Table 6.

Table 6
NT5K82AA PAD switching

New loss plan	Long Line	Short Line
Analog-to-Digital loss	-4.5 dB	-2.5 dB
Digital-to-Analog loss	+2.0 dB	+4.0 dB

Note: The tolerance for the above nominal values is +0.7dB, -0.5dB.

Trunk types description

Each NT5K82AA Central office trunk card supports:

- Loop start operation
- Loop break detection and supervision
- Busy tone detection and supervision
- Barring detection and supervision.

Loop start operation

Loop start operation is configured in software and is implemented in the card through software download messages.

Idle state

In the idle state, the central office trunk card provides a high impedance loop toward the central office for isolation and dc detection.

Call placed by central office

The Central Office initiates a call by applying ringing between the tip and ring leads. If the call is answered, the ringing detector on the trunk card is switched out and a low resistance DC loop is placed between the tip and ring leads.

Call placed by Option 11

To initiate a call, the Option 11 switches out the ringing detector and places a low resistance loop across the tip and ring leads. The Option 11 sends digits in the form of Dual Tone Multifrequency (DTMF) tones or pulse digits.

Central office disconnect

The central office disconnects a call in one of two ways:

- by applying a calibrated 120 ms break in battery towards the Option 11. If the central office trunk card is configured to detect loopbreak, it will disconnect the call.
- by applying busy tone toward the Option 11. If the central office trunk card is configured to detect busy tone, it will disconnect the call.

Option 11 disconnect

The Option 11 disconnects the call by removing the loop between the tip and ring leads and replacing it with a high impedance loop.

Features description

Periodic Pulse Metering (PPM)

All trunk units on the NT5K82AA card can be individually configured to support the Periodic Pulse Metering (PPM) feature.

Periodic Pulse Metering allows the user of a telephone on a Option 11 to keep an accurate record of central office calls for billing or administration purposes.

For more information on PPM, refer to *Generic X11 Including Supplementary Features appendix 2 to 553-2311-105.*

Call barring

Call barring removes a trunk unit from service when a loss of battery feed to the unit is detected for more than 300 ms. The Option 11 disconnects the call and the unit remains out of service until battery feed is returned. When battery returns, the unit is placed in the idle state.

E&M tie trunk circuit card

Functional description

The NT5K83AA E&M Tie trunk card provides the interface between the Option 11 system and up to four analog trunks. It can be installed in slots 1-10 in the main cabinet and in any slot in the expansion cabinet.

The NT5K83AA E&M Tie trunk card supports four analog trunks. Each trunk circuit can be individually configured as:

- 4-wire E&M Type 1 and 2
- Recorded Announcement trunk (RAN)
- Music trunk (MUS)
- Paging trunk (PAG)

Common features

The NT5K83AA E&M Tie trunk card:

- is equipped with four trunk units
- converts transmission signals from analog-to-digital and from digital-to-analog
- provides software selectable A-law or μ-law operation
- enables and disables individual units or the entire card under software control
- provides outpulsing on the card. Make break ratios are defined in software and downloaded during power up and by software commands.

- provides indication of card status from self-test diagnostics on the LED
- allows trunk type to be configured on a per unit basis in software
- provides termination against 600 ohms for 4-wire E&M trunk circuits
- provides flexible transmission for various loss plans
- provides paging (PAG), recorded announcement (RAN), and Music (MUS) interfaces.

Physical description

Switch settings

There are no option switches on the NT5K83AA E&M Tie trunk card. All settings are configured in software.

Connections

The NT5K83AA E&M Tie trunk card has four units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal.

At the cross-connect terminal, each unit connects to external apparatus by tip and ring leads.

Hardware installation

Tables 1 to 3 provide cross connect information for the NT5K83AA E&M trunk card.

Table 7
NT5K83 E&M 2-Wire Paging trunk connections

Lead designations	Pins	Pair color	Unit number
T0 R0	27 2	W-O O-W	Unit 0
A PG	29 4	W-BR BR-W	
T1 R1	31 6	R-BL BL-R	Unit 1
A PG	33 8	R-G G-R	
T2 R2	35 10	R-S S-R	Unit 2
A PG	37 12	BK-O O-BK	
T3 R3	39 14	BK-BR BR-BK	Unit 3
A PG	41 16	Y-BL BL-Y	

Table 8
NT5K83AA E&M 2-wire Recorded Announcement trunk connections

Lead designations	Pins	Pair color	Unit number
T0 R0	26 1	W-BL BL-W	Unit 0
SIG B SIG A	29 4	W-BR BR-W	
T1 R1	30 5	W-S S-W	Unit 1
SIG B SIG A	33 8	R-G G-R	
T2 R2	34 9	R-BR BR-R	Unit 2
SIG B SIG A	37 12	BK-O O-BK	
T3 R3	38 13	BK-G G-BK	Unit 3
SIG B SIG A	41 16	Y-BL BL-Y	

Table 9
NT5K83AA E&M 4-Wire Type 1 and Type 2 connections

Lead designations	Pins	Pair color	Unit number
TA TB	26 1	W-BL BL-W	Unit 0
RA RB	27 2	W-O O-W	
E M	28 3	W-G G-W	
TA TB	30 5	W-S S-W	Unit 1
RA RB	31 6	R-BL BL-R	
E M	32 7	R-O O-R	
TA TB	34 9	R-BR BR-R	Unit 2
RA RB	35 10	R-S S-R	
E M	36 11	BK-BL BL-BK	
TA TB	38 13	BK-G G-BK	Unit 3
RA RB	39 14	BK-BR BR-BK	
E M	40 15	BK-S S-BK	
Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.			

Trunk configuration

Route Data Block

Each trunk unit on the NT5K83AA E&M trunk card is attached to a route with an associated route data block. The route data block is programmed in overlay 16.

Note: All prompts are defaulted except for those noted in Table 4. Default values are shown in brackets.

Table 10
LD 16 Route Data Block

Prompt	Response	Comments
REQ	NEW	
TYPE	RDB	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-511	Enter route number
TKTP	TIE, (RAN), (PAG)	Define trunk type as Tie, (Recorded announcement) or (Paging)
ICOG	IAO	Incoming and Outgoing trunk
ACOD	XX	XX=Trunk route access code

Trunk Data Block

Use overlay 14 to configure each of the trunk units on the NT5K83AA E&M trunk card. Default values are shown in brackets.

Table 11
LD 14 Route Data Block

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	TIE, (RAN), (PAG)	Trunk type Tie, (Recorded announcement), (Voice paging)
TN	CC UU	Terminal number of the unit in Option 11 format: CC=card number UU=unit number
XTRK (see note)	XFEM	Type is IPE XFEM
SIGL	EM4	4 wire E&M speech
EMTY	TY1, (TY2)	Type 1 signaling, (Type 2)
STRI	IMM, (WNK), (DDL)	Incoming start Immediate, (Wink), (Delayed dial)
STRO	IMM, (WNK), (DDL)	Outgoing start immediate, (Wink), (Delayed Dial)
SUPN	YES, (NO)	Answer and disconnect supervision
CLS	TRC, (NTC)	Attenuation pads in, (out)

Note: This prompt is required only for the first unit defined on each NT5K83AA card.

Self-test

When the NT5K83AA E&M Tie trunk card is installed and power is applied to it, a self-test is performed on the card. The red LED on the NT5K83AA faceplate flashes three times, then remains continuously lit until the card is enabled in software. If the self-test fails, the LED will remain lit after the card is enabled.

Technical description

Power requirements

Table 6 lists the power requirements for the NT5K83AA trunk card.

Table 12
NT5K83AA Power requirements

Voltage	Active Current
+/- 15.0 V dc	150 ma
- 15 V dc	150 ma
+8.5 V dc	35 ma
+ 5 V dc	110 ma
-48 V dc	80 ma

Environmental specifications

Table 7 provides the environmental specifications for the NT5K83AA E&M Tie trunk card.

Table 13
NT5K83AA Environmental specifications

Parameter	Absolute Limit
Operating temperature	10-45 degrees C, ambient
Operating humidity	20 to 80% RH (non condensing)
Storage temperature	-20 to +60 degrees C

Transmission parameters

Nominal loss values for the NT5K83AA E&M trunk card are given in Table 8.

Table 14
Loss values for NT5K83AA E&M trunk card

	Analog-to-Digital	Digital-to-Analog
4-wire E&M:		
Pad OUT Pad IN	-3.5 dB -1.5 dB	+3.0 dB +5.0 dB
PAG	not applicable	+5.5 dB
RAN/MUS	-1.5 dB	not applicable

Trunk types description

Each unit on the NT5K83AA E&M Tie trunk card supports:

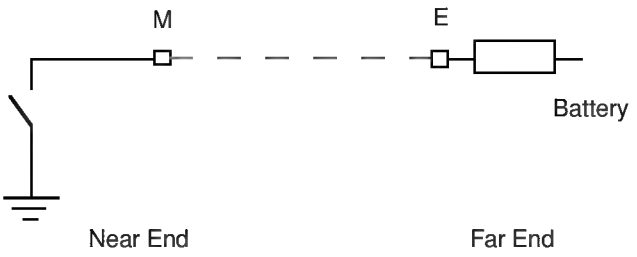
- 4-wire E&M trunk type 1 and 2
- Recorded Announcement (RAN) trunk
- Paging (PAG) trunk
- Music (MUS) trunk

For information on features and signaling arrangements, see *Generic X11 Including Supplementary Features* (PO730484).

4-wire E&M Type 1 trunk operation

Type 1 E&M operation uses two signaling leads, E and M, that are electrically separated from the associated speech circuit. Signals are sent on the M lead and received on the E lead as shown in Figure 1.

Figure 1
E&M Type 1 signaling



Send signals

All signals are sent in the form of a contact between M and ground or an open circuit between M and ground.

Receive signals

Signals are received on the E lead by detecting the conditions applied to the M lead by the far end.

Idle state

In the Idle state, the M lead receives an "idle signal" from the Option 11 and is ready to receive calls.

Seize

To place an outgoing call, the Option 11 at the near end sends a seizing signal through the M lead to the far end. The incoming end recognizes the seize signal and prepares to receive digits.

Dialing

Digits are sent through the near end M lead in the form of 10 pps pulses of the open-circuit condition.

Answer

When the called party answers, the far end sends an "answer" signal through the M lead.

Call disconnect

Either party can disconnect the call by applying a clear signal to the M lead. The far end applies a "clear back" signal, while the near end applies a "clear forward" signal. The circuit remains busy until both clear forward and clear backward signals have been exchanged.

Table 9 provides a summary of NT5K83AA Type 1 signaling states.

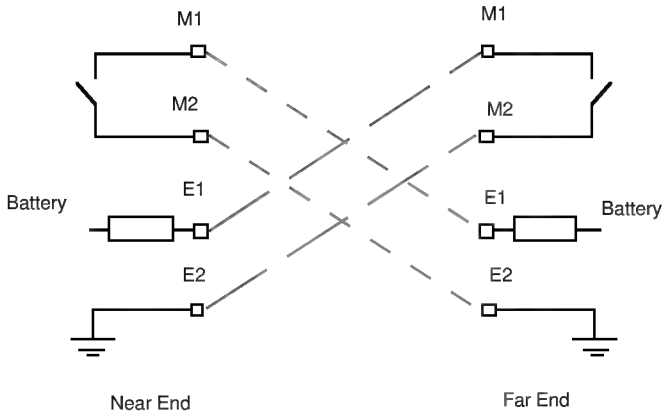
Table 15
Summary of NT5K83AA Type 1 signaling states

Signal	Outgoing PBX sending condition — M Wire	Incoming PBX sending condition — M Wire
Idle	Open circuit	Open circuit
Seize	ground	—
Digit Pulse	Open circuit pulses in step with dial pulses	—
Answer	—	Ground
Clear forward	Open circuit for longer than 300 ms	—
Clear back	—	Open circuit for longer than 300 ms

4-wire E&M Type 2 trunk operation

Type 2 E&M operation uses two signaling pairs, E and M, that are electrically separated from the associated speech circuit. Signals are sent on the M pair and received on the E pair as shown in Figure 2.

Figure 2
E&M Type 2 signaling



Send signals

All signals are sent in the form of a contact make or break between the two M leads. In the make state there is a maximum of 200 V√Ω between the two M leads. In the break state there is a minimum of 100 kΩ between the M leads.

Receive signals

Signals are received on the E lead by detecting the contact make or break applied at the far-end on the M leads.

Idle state

In the Idle state the Option 11 applies an "Idle Signal" to the M leads to indicate that it is available to receive calls.

Seize

To place an outgoing call, the Option 11 at the near end sends a seizing signal through the M leads to the far end. The incoming end (far end) recognizes the seize signal, busies the circuit against outgoing calls, and prepares to receive digits.

Dialing

Digits are sent through the near end M leads in the form of 10 pps pulses of the open-circuit condition.

Answer

When the called party answers, the far end sends an "answer" signal through the M leads.

Call disconnect

Either party can disconnect the call by applying a clear signal to the M leads. The far end applies a "clear back" signal, while the near end applies a "clear forward" signal. The circuit remains busy until both clear forward and clear backward signals have been exchanged.

Table 10 provides a summary of NT5K83AA Type 2 signaling states.

Table 16
Summary of NT5K83AA Type 2 signaling states

Signal	Outgoing PBX sending condition — M Leads	Incoming PBX sending condition — M Leads
Idle	Contact break	Contact break
Seize	Contact make	—
Digit Pulse	Contact break pulses in step with dial pulses	—
Answer	—	Contact make
Clear forward	Contact break for longer than 300 ms	—
Clear back	—	Contact break for longer than 300 ms

Recorded Announcement/Music trunk operation

When used in the Recorded Announcement/Music mode, the trunk circuit is connected to a customer provided recorded announcement machine or a music source.

Machines supported

The NT5K83AA E&M Tie trunk card supports the following types of announcement machines:

- Start mode announcement machines
- Continuous mode announcement machines.

Recorded announcers supported include the Cook Digital 4-channel announcer and the Audichron HQI-112.

Start mode

In start mode, the E&M Tie trunk card provides a startpulse to the announcement machine to begin playback of the message. The announcement source requires the following:

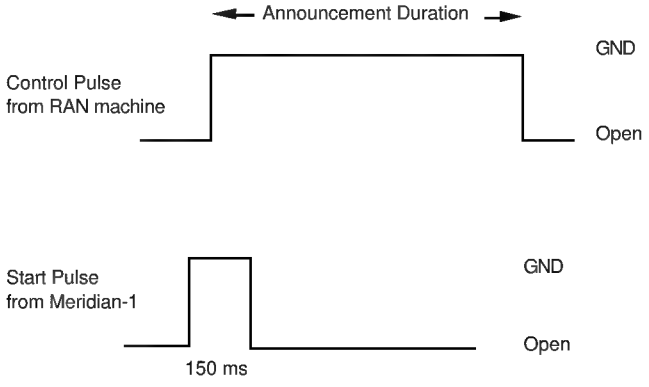
- an impedance of 4 ohms or less
- ground to the trunk unit when playing and an open circuit when idle. This is done through a control lead to the trunk circuit.
- default signal level of -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

To start the announcement, the NT5K83AA E&M Tie trunk card provides a momentary ground signal (150 ms) to the source. The announcement machine should then start playing its message.

The NT5K83AA trunk card expects status information from the announcement machine, that is, whether it is idle or playing. For this reason, the announcement machine requires a control lead to the trunk circuit.

Figure 3 shows recorded announcement in start mode.

Figure 3
Recorded announcement - start mode



Continuous mode

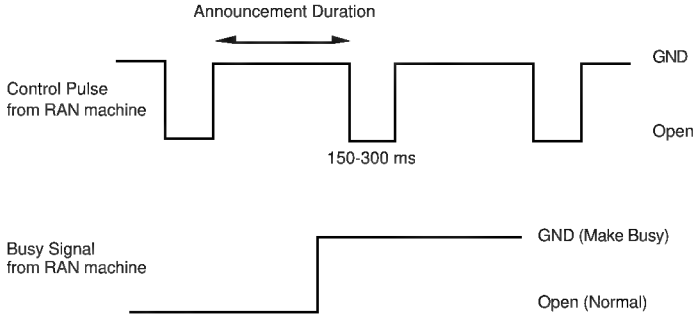
The requirements for continuous mode announcement machines are as follows:

- an impedance of 4 ohms or less
- generation of a control pulse (150 - 300 ms) at the start of the announcement period
- default signal level of -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

The announcement machine may provide a separate busy signal when the machine is recording or erasing a message or if the machine is malfunctioning. The busy signal will be used by the Option 11 for maintenance purposes.

Figure 4 shows recorded announcement in continuous mode.

Figure 4
Recorded announcement - continuous mode



Music source

The music source should provide an impedance of 600 Ω. The default signaling level should be -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

Paging trunk operation

When used in the paging mode, the trunk circuit is connected to a customer-provided paging amplifier system. When accessed, the card provides a loop closure. In a typical application, the loop closure will cut off a music supply and switch the paging trunk transmission path to the paging amplifier.

Direct Inward Dial trunk card

Functional description

The NT5K84AA Direct Inward Dial (DID) trunk card provides the interface between the Option 11 system and up to eight analog DID trunk lines. It can be installed in slots 1-10 in the main cabinet and in any slot in the expansion cabinet.

Common features

Each NT5K84AA DID trunk card:

- converts transmission signals from analog-to-digital and from digital-to-analog for up to 8 audio paths
- supports the new Swiss loss plan
- provides adjustable transmission pads for long line or short line operation
- provides termination and transhybrid balance impedance to match the Swiss complex impedance network
- provides the correct signaling impedance and voltages to operate with the Swiss central office
- supports multi-frequency compelled (MFC) signaling when used with the MFC Sender/Receiver card (NT5K21).

Microprocessor

The NT5K84AA DID trunk card is equipped with an Intel 87C52 microprocessor that controls card operation and provides the communication function for the card. It contains 8k of Read Only Memory (ROM) and 256 bytes of Random Access Memory (RAM).

Signalling and control

The signaling and control portion of the NT5K84AA DID trunk card operates with the Central Processing Unit (CPU) to control card hardware. The card receives messages from the CPU over a signaling channel and returns status information to the CPU over the same channel. The signaling and control portion of the card provides the means for analog loop terminations to establish, supervise, and take-down call connections.

Signalling interface

Trunk signaling messages are three bytes in length. The messages are transmitted in channel zero of the DS-30X in A10 format.

Configuration information for the NT5K84AA DID trunk card is downloaded automatically from the CPU during power-up or manually by commands from maintenance programs.

Physical description

Measurements

Each NT5K84AA DID trunk card measures as follows:

Height:	318 mm (12.5 in.)
Depth:	254 mm (10 in.)

Connections

The NT5K84AA DID trunk card has eight units. Each trunk unit on the card connects to the backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel, and the I/O panel is cabled to the cross-connect terminal.

At the cross-connect terminal, each unit connects to external apparatus by tip and ring leads.

Hardware installation

Table 1 provides cross connect information for the NT5K84AA DID Trunk card.

Table 17
NT5K84AA DID Trunk connections

Lead	Pins	Pair color	Unit number
T0 R0	26 1	W-BL BL-W	Unit 0
	27 2	W-O O-W	
T1 R1	28 3	W-G G-W	Unit 1
	29 4	W-BR BR-W	
T2 R2	30 5	W-S S-W	Unit 2
	31 6	R-BL BL-R	
T3 R3	32 7	R-O O-R	Unit 3
	33 8	R-G G-R	
T4 R4	34 9	R-BR BR-R	Unit 4
	35 10	R-S S-R	
T5 R5	36 11	BK-BL BL-BK	Unit 5
	37 12	BK-O O-BK	
T6 R6	38 13	BK-G G-BK	Unit 6
	39 14	BK-BR BR-BK	
T7 R7	40 15	BK-S S-BK	Unit 7
	41 16	Y-BL BL-Y	

Trunk configuration

Route Data Block

Each trunk unit on the NT5K84AA DID card is attached to a route with an associated route data block. The route data block is programmed in LD 16.

Note: All prompts are defaulted except for those noted below. Default values are shown in brackets.

Table 18
LD 16 Route Data Block

Prompt	Response	Comments
REQ	NEW	
TYPE	RDB	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-511	Enter route number
TKTP	DID	Trunk type is Direct Inward Dial
ICOG	ICT	Incoming only trunk
ACOD	XX	XX=trunk route access code
MFC	YES, (NO)	Multi-frequency compelled signaling enabled, (disabled)
CNTL	YES	Change controls or timers
TIMR	EOD 19968	Set End of Dial timer to 19968 ms
	ICF 0	Set Incoming Flash timer to 0 ms
	GTI 128	Set Guard Timer Incoming to 128
NEDC	ETH	Near end disconnect control from either end
FEDC	ETH	Far end disconnect control from either end
PRDL	BSY	Return Busy Tone on partial dial timeout
EOS	YES	Send End of Selection (number received) signal

Trunk Data Block

Use overlay 14 to configure each of the trunk units on the NT5K84AA DID trunk card. Default values are shown in brackets.

Table 19
LD 14 Route Data Block

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	DID	Direct Inward Dial
TN	LL SS CC UU	Terminal Number of the unit: Loop, Shelf, Card, Unit
XTRK (see note)	XDID	Type is IPE DID
SIGL	EAM	E&M signaling
SUPN	YES	Answer and disconnect supervision required
CLS	SHL, (LOL)	Attenuation pads in, (out)

Note: This prompt is required only for the first unit defined on each NT5K84AA card.

Self-test

When the card is installed, the red Light Emitting Diode (LED) on the faceplate flashes as the self-test runs. If the self-test completes successfully, the card is automatically enabled (if it has been configured in software) and the LED goes out. If the self-test fails, the LED will remain lit.

Technical description

The technical details of the NT5K84AA Direct Inward Dial trunk card are outlined below.

Power requirements

Table 4 lists the power requirements for the NT5K84AA DID trunk card.

Table 20
NT5K84AA power requirements

Voltage	Idle current	Active current	Disabled current
+15 V dc	67 ma	162 ma	67 ma
-15 V dc	212 ma	212 ma	125 ma
+8.5 V dc	80 ma	80 ma	77 ma
-48 V dc	0 ma	0 ma	64 ma
+ 5 V dc	218 ma	249 ma	105 ma

Environmental specifications

Table 5 lists the environmental specifications for the NT5K84AA DID card.

Table 21
NT5K84AA Environmental specifications

Parameter	Specifications
Operating temperature	0 to 50 degrees C, ambient
Operating humidity	10 to 95 % RH (non-condensing)
Storage temperature	- 45 to + 70 degrees C
Storage humidity	0 to 95% Relative Humidity

PAD switching

The NT5K84AA Direct Inward Dial trunk card supports the new Swiss loss plan. Software configuration allows the selection of 2dB short line loss pads on a per unit basis.

The loss plan for the NT5K84AA DID card is given in Table 6.

Table 22
NT5K82AA PAD switching

New loss plan	Long Line	Short Line
Analog-to-Digital loss	-4.5 dB	-2.5 dB
Digital-to-Analog loss	+2.0 dB	+4.0 dB

Note: The tolerance for the above nominal values is +0.7dB, -0.3dB.

Direct Inward Dial description

Each unit on the NT5K84AA DID card is capable of operating as a DID trunk. Table 7 presents a summary of NT5K84AA DID trunk card signaling states.

Idle State

In the idle state, the central office has no battery present, and a high impedance loop is placed across the tip and ring leads (the central office is passive). The DID unit presents a high impedance loop to the central office.

Seize

The central office initiates a call by applying battery (-48V on ring, 0V on tip). The DID recognizes the signal if it is applied for more than 40 milliseconds.

Proceed to send

If the NT5K84AA DID card is configured to receive impulse dialing, it will send a "proceed to send" signal to the central office by switching to a low impedance loop. This signal tells the central office that the Option 11 is ready to receive dialing information.

If the NT5K84AA DID card is configured for multi-frequency compelled signaling, it remains in the high impedance loop state and does not send a proceed to send signal.

Impulse dialing

The central office sends address digits using impulse dialing. The signaling rate is 10 PPS plus or minus 5%. The DID unit collects the dialing information, validates it, and reports each digit to the Option 11 central processing unit (CPU).

End of selection (number received)

The NT5K84AA DID card sends and "End of Selection" signal to the central office if one of three things occur:

- no digits are received within twenty seconds of sending the "proceed to send" signal.
- there is a delay of twenty seconds between received digits.
- enough digits have been received to complete the call.

The NT5K84AA sends the "End of Selection" signal by switching from a low impedance loop to a high impedance loop.

MFC signals

When the DID route is configured for Multi-frequency Compelled (MFC) signaling, the NT5K84AA trunk card provides a transmission path between the central office and the NT5K21 XMFC pack. MFC signaling information is then exchanged between the NT5K21 pack and the central office.

For more information on the NT5K21 XMFC card, refer to the Option 11 *Technical reference guide—Book 2* (553-3011-100).

Answer

When the terminating party answers, the DID places a low impedance loop across the tip and ring leads.

Central office disconnect

The central office disconnects the call by removing the battery from the tip and ring leads and returning to the passive state (high impedance loop).

When the DID unit detects the battery removal, it sends a change of state message to the central processing unit (CPU). The CPU will send a release acknowledgment message to the DID unit, which will respond by returning to the idle state.

Option 11 disconnect

When the Option 11 disconnects the call, the CPU sends a message to the DID unit, which in turn will respond by returning to the idle state.

The central office detects the idle state and restores the high impedance loop on the tip and ring wires. The CPU interprets the high impedance loop as a release acknowledgment signal from the central office.

Disabled or barred condition

When a DID unit is busy or disabled and cannot accept a call, it presents a barred condition to the central office. In this state, -48V is present on the tip lead and 0V on the ring lead.

Table 23
Summary of NT5K84AA DID Trunk card signaling states

Signal	Direction of signal	Option 11 (O11)	Central office (CO)
Idle	—	Passive, high impedance	Passive
Seize	CO to O11	Passive, high impedance	Active
Impulse Dialing:			
Proceed to send	O11 to CO	Passive, low impedance	Active
Dialing	CO to O11	Passive, low impedance	Passive/Active
End of Selection	O11 to CO	Passive, high impedance	Active
MFC Signaling:			
MFC signals	Bothway	Passive, high impedance	Active
Answer	O11 to CO	Passive, low impedance	Active
CO Disconnect first:			
Forward release	CO to O11	Passive, low impedance	Passive
Forward release acknowledge	O11 to CO	Passive, high impedance	Passive
O11 Disconnect first:			
Backward release	O11 to CO	Passive, high impedance	Active
Backward release acknowledge	CO to O11	Passive, high impedance	Passive
Disabled or barred	O11 to CO	Active	Passive

Meridian 1

Intelligent peripheral equipment circuit cards for Switzerland

Option 11 - Description and Installation

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